

## Three Phase Resonant DC Power Converter for Ion Thrusters, Phase I

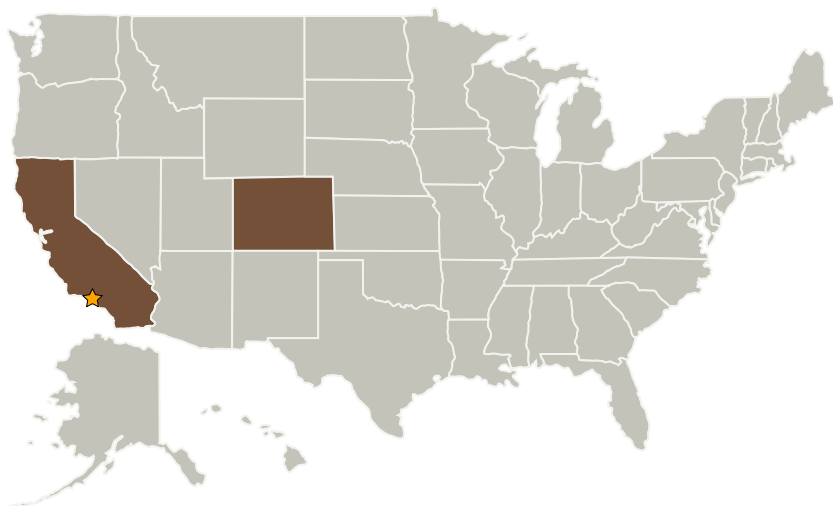


Completed Technology Project (2004 - 2004)

## Project Introduction

The new generation of, high performance electric propulsion missions will require high mass throughput and most likely the use of grided ion thruster equipped with carbon based grids will be required to meet the extremely high life requirements. However, because of the high susceptibility of these carbon based grids to damage during recycle event they will require a low stored energy beam power DC-DC converter. An innovative three-phase resonant DC converter, which produces high levels of DC beam power with minimal stored energy is proposed. This new design combines proven industrial technologies with a innovative new design that relies on combined outputs of phase-shifted converters to produce a low ripple DC voltage without output filtering. It is anticipated that stored energy can be reduced by two orders of magnitude when compared to the ?present state of the art? converters. Additionally, the resonant power conversion topology facilitates both higher switching frequencies and power densities, which in turn lowers power module mass. Once complete, these new DC-DC converters will significantly increase the current state of the art by reducing both the stored output energy and mass of the beam DC-DC converter. These changes will enable the present state of the art carbon based grids to obtain the required life for high performance deep space missions.

## Primary U.S. Work Locations and Key Partners



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## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Colorado Power Electronics, Inc.	Supporting Organization	Industry Veteran-Owned Small Business (VOSB)	Fort Collins, Colorado

## Primary U.S. Work Locations

California	Colorado
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Geoffrey N Drummond

## Technology Areas

**Primary:**

- TX03 Aerospace Power and Energy Storage
  - └ TX03.3 Power Management and Distribution
    - └ TX03.3.3 Electrical Power Conversion and Regulation